

## **AMENDMENTS TO THE SPECIFICATION**

Please insert the following new heading before paragraph [0007]:

### **BRIEF SUMMARY OF THE INVENTION**

Please replace paragraph [0007] with the following amended paragraph:

[0007] ~~Proceeding from this related art, the~~ The present invention is based on ~~the~~an object of providing a filler for polymers which, with comparable properties, has a significantly reduced content of active material, in particular a reduced heavy metal content.

Please replace paragraph [0008] with the following amended paragraph:

[0008] A further object is providing a filler, ~~using which~~through use of the aging behavior of polymers, in particular of elastomers, is drastically improved and using which a set of mechanical values may be achieved which is not reached even at a significantly increased degree of filling of classical additives.

Please replace paragraph [0019] with the following amended paragraph:

[0019] Through targeted thermal aging, a layer made of oxidic material ~~is~~may be produced from the precursor substances, which is distinguished by a strong fissuring of the surface. In addition to an irregular surface of the carrier particles, which may possibly already be provided, this results in an enlargement of the surface of the particles. This is expressed in an enlargement of the specific surface area after the thermal treatment of the carrier particles coated with precursor substance.

Please replace paragraph [0020] with the following amended paragraph:

[0020] Typically, the specific surface area (ascertained according to the BET method) ~~is~~may be enlarged by the thermal treatment by at least 10%, preferably by at least 25%. Without being bound to theoretical considerations, it is assumed that due to the decomposition of the organic residues of the precursor substance(s) in the outer layer, pores and/or sinks arise, on and/or in which the ultrafine particles made of active material accumulate. Because these particles are

situated on the surface, it is possible to lower their content and still obtain the desired effects, such as catalytic or stabilizing properties.

Please replace paragraph [0022] with the following amended paragraph:

[0022] The surfaces produced according to the present invention ~~are~~may be strongly fissured, i.e., they have pores and/or sinks which arise due to the shrinkage of the thermally labile precursor substance (calcination).

Please replace paragraph [0023] with the following amended paragraph:

[0023] Particles made of any arbitrary materials may be used as the particles made of active material which are adsorbed or fixed in another way on the surface of the particle composites according to the present invention. These may have any arbitrary form, such as round, ellipsoidal, or irregular. However, they are finely divided particles having a mean diameter of less than 1  $\mu\text{m}$ , determined with the aid of electron microscopy and the BET method, preferably from 0.01  $\mu\text{m}$  to 0.5  $\mu\text{m}$ . The particles made of active material in the ~~composite~~ particle composite according to the present invention are significantly smaller than the particular carrier particles. The ratio of the mean diameter of particles made of active material to the mean diameter of the carrier particle is typically less than 1:10, preferably 1:10 to 1:1000.

Please replace paragraph [0024] with the following amended paragraph:

[0024] It is assumed that the particles made of active material ~~are~~may be intercalated in the pores or sinks of the fissured surface, so that they are freely accessible from the surroundings of the particle composite.

Please replace paragraph [0031] with the following amended paragraph:

[0031] According to the present invention, the carrier material ~~is~~may be coated with a suitable thermolabile substance. The layer made of the thermolabile substance is then thermally treated, so that through decomposition of this thermolabile substance while obtaining the layer, the surface of the coated carrier is enlarged and the ultrafine particles made of active material are then applied to the enlarged surface.

Please replace paragraph [0035] with the following amended paragraph:

[0035] The thermolabile substances ~~are~~may be applied using methods known per se to the surface of the carrier material. Examples of these methods are the impregnation of the surface of the carrier material with the thermolabile substance or a mixture of thermolabile substances or the direct application of thermolabile substances to the carrier material through simple mixing of both components. The thickness of the resulting layer may be set in a known way via the concentration in the impregnation solution or impregnation suspension or emulsion. Typical layer thicknesses of the layer made of thermolabile substance on the carrier material are in the range from 10 nm to 1000 nm, preferably 2 nm to 100 nm.

Please replace paragraph [0038] with the following amended paragraph:

[0038] The coated carrier material is subsequently may be dried in air. Typical drying times are at least six hours, preferably at least twelve hours. The drying temperature is selected as between 50°C and 150°C depending on the thermal resistance of the adsorbed substance.

Please replace paragraph [0044] with the following amended paragraph:

[0044] After the thermal treatment of the layer made of thermolabile substance or alternatively after the application of this layer to the carrier material and before the thermal treatment of the layer made of thermolabile material, the coated carrier material ~~is~~may be treated with ultrafine particles and/or precursor substances for ultrafine particles. These are fixed on the surface of the layer made of thermolabile substance or made of the layer which is already thermally treated.

Please replace paragraph [0045] with the following amended paragraph:

[0045] The substances described above or their precursors may be selected as the active materials. Carrier materials, thermolabile substances, and active materials or their precursors ~~are to~~may be selected in the individual case in such a way that the dimensions of the carrier material and the active material do not change or change less than 5% at the required temperature of the thermal treatment and that the thermolabile substance and the precursor of the active material change at the temperature of the thermal treatment. The active phase may be produced either simultaneously with the decomposition of the thermolabile substance or after its decomposition.

Please replace paragraph [0057] with the following amended paragraph:

[0057] If the adsorbed substance is a precursor which must still be converted into the active phase, the material ~~is~~may be thermally treated, possibly under an appropriate gas atmosphere, at the decomposition temperature of the precursor. The reaction conditions are optimized by those skilled in the art on the basis of routine considerations, results from thermal analysis, preferably calorimetry and thermogravimetry, being used.

Please replace paragraph [0066] with the following amended paragraph:

[0060] Particles in the size range from 1 nm to 1  $\mu$ m ~~are~~ may be applied or produced on the surface through the method according to the present invention. The particles are adsorbed on the surface and anchored securely by the irregularities of the surface to the carrier lying underneath. Due to this secure fixing, the particles made of active material are not able to agglomerate, so that their surface is almost 100% accessible. The inaccessible volume component, which is located in the interior of the particles in typical carrier-bound materials, may thus be reduced to a minimum as a permanent development.

Please replace paragraph [0065] with the following amended paragraph:

[0065] In addition, the size dependence of specific effects ~~is~~ may not only be quantitative, but rather also qualitative in nature, an effect which is known from heterogeneous catalysis as "structural sensitivity." Thus, ultrafine additives usually may not unfold their full potential in polymer matrices, because they are already provided as agglomerates or agglomerate during the mixing process. The attempt to achieve the object of avoiding this set of problems is to transfer the principle of producing heterogeneous catalysts to fillers for polymers. The ultrafine particles are not applied in the mixing process, but rather to larger fillers which are contained in the polymer in any case.

Please insert the following new heading before paragraph [0067]:

#### BRIEF DESCRIPTION OF THE DRAWINGS

Please replace paragraph [0068] with the following amended paragraph:

[0068] Figure 1 shows the principle of the present invention in comparison with previously known achievements ~~of the object~~.

Please insert the following new heading before paragraph [0070]:

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Please replace paragraph [0071] with the following amended paragraph:

[0071] It may be seen from the left side of Figure 1 that the particles used in the classical approach, such as filler particles (1) 1 and particles made of active phase (2) 2 have a significant, chemically inactive dead volume. This may be significantly reduced by fixing ultrafine particles made of active material (4) 4 on a carrier particle (3) 3. Fillers produced in this way already result in very good mechanical values in polymers, even after heat aging in accordance with DIN 53 508. The thermal treatment necessarily reduces the specific surface area of the carrier, however.

Please replace paragraph [0072] with the following amended paragraph:

[0072] In order to prevent this and achieve an extraordinary stability of polymers regarding heat aging via an increased specific surface area of the filler, the carrier material ~~must~~may be provided with a thermolabile substance according to the method according to the present invention ~~(not shown on the right side of Figure 1)~~. A fissured or fractal surface then results during the thermal treatment, i.e., the specific surface area, and thus the activity of the filler is increased once again. A resistance to heat aging may thus be achieved, which differs significantly once again from that of a carrier-bound, but not surface-modified system.

Please replace paragraph [0072] with the following amended paragraph:

[0073] An embodiment of the method according to the present invention is sketched in Figure 2. A carrier particle (3) 13 is combined with a thermolabile precursor substance. A layer (5) 5 made of the thermolabile precursor substance forms on the surface of carrier particle (3) 13. Through thermal treatment of the coated carrier particle, a layer (6) 6 which has a strongly fissured surface arises through at least partial decomposition of the precursor substance. This is

impregnated with ultrafine particles made of active material (3) 14 and the particle composite according to the present invention thus arises.

Please replace the first line of page 16 with the following:

~~Patent Claims~~ WHAT IS CLAIMED IS: